

Strengthening the Theoretical of Geotourism: A Systematic Literature Review

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Abstract

Over the past two decades, geotourism and geoheritage have gained increasing recognition as essential components of sustainable tourism and geological heritage conservation. Nevertheless, most existing reviews remain limited to site inventories or mapping publication trends. Few studies have engaged deeply with theoretical and conceptual frameworks across disciplines, and the research landscape continues to be dominated by work conducted in Europe and East Asia. This study aims to systematically examine how theoretical frameworks have been applied in geotourism and geoheritage research, while also analyzing the geographical distribution of publications to identify opportunities for advancing knowledge in the Global South. The research employed a systematic literature review following the PRISMA 2020 protocol. Scopus served as the primary database, yielding 718 records at the identification stage. After screening and applying inclusion and exclusion criteria, a total of 43 articles were included in the final analysis. The findings reveal that most studies continue to emphasize geosite inventories and geoheritage assessments, whereas the application of behavioral theories, conceptual models, and interdisciplinary approaches remains limited. Geographically, the literature is heavily concentrated in Europe and East Asia, with Southeast Asia, Africa, and Latin America remaining underrepresented. This study contributes by highlighting conceptual and spatial gaps that have not been comprehensively addressed in prior reviews. The implications suggest the need for stronger theoretical foundations and expanded research in the Global South to promote a more inclusive and globally sustainable development of geotourism.

Keyword: geotourism; geopark; theoretical frameworks; sustainable tourism

1. Introduction

Over the past two decades, geotourism and geoheritage have emerged as pivotal concepts in sustainable tourism and environmental conservation. Geotourism, initially defined as tourism focusing on geological and geomorphological features (Hose, 1995; Dowling & Newsome, 2005), has gradually expanded to encompass broader cultural, social, and ecological dimensions (Newsome & Dowling, 2010). Parallely, geoheritage emphasizes the conservation of geological diversity, including landforms, minerals, fossils, and landscapes of scientific, cultural, and aesthetic value (Brilha, 2015; Gray, 2018). Together, these concepts have gained increasing recognition as integral components of the sustainable development agenda, particularly through initiatives such as the UNESCO Global Geoparks Network (GGN) established in 2000, which integrates conservation, education, and local development (Nyulas et al., 2025).

Despite this progress, the scholarly landscape remains fragmented. Much of the literature continues to prioritize geosite inventories and assessment methodologies, often emphasizing

technical classifications and quantitative mapping (Ólafsdóttir & Tverijonaite, 2018; Gupta et al., 2024). While such approaches provide crucial baselines for conservation, they frequently lack theoretical grounding in tourism studies, behavioral sciences, or interdisciplinary frameworks that could deepen understanding of how geotourism operates as a social, cultural, and economic practice. Recent reviews highlight that the majority of contributions are concentrated in Europe and East Asia, with comparatively limited attention to Southeast Asia, Africa, and Latin America (Quesada-Valverde & Quesada-Román, 2023). This uneven distribution underscores the need to broaden both the geographical scope and the theoretical bases of geotourism research.

Several gaps can be identified in the current body of work. First, the application of behavioral and conceptual models in geotourism—such as those derived from consumer behavior, sustainable tourism frameworks, or heritage interpretation—remains underdeveloped (Gupta et al., 2024). Second, while geopark-related studies are growing rapidly, they often approach geotourism from a managerial or conservationist perspective rather than from a robust theoretical foundation (Nyulas et al., 2025). Third, there is a pronounced spatial bias, with most empirical and conceptual contributions originating in Global North contexts, while the Global South remains underrepresented despite its rich geodiversity and socio-cultural assets (Quesada-Valverde & Quesada-Román, 2023). Addressing these gaps is essential to avoid a one-sided understanding of geotourism and to promote more inclusive, globally relevant frameworks.

Against this backdrop, this study undertakes a Systematic Literature Review (SLR) following the PRISMA 2020 protocol to critically examine how theoretical frameworks have been applied in geotourism and geoheritage research. Specifically, it seeks to (1) map the use of theories and conceptual approaches across disciplines, (2) analyze the geographical distribution of existing scholarship, and (3) identify opportunities to strengthen theoretical foundations and expand research in underrepresented regions, particularly in the Global South. By doing so, this review contributes to advancing geotourism as not only a conservation and development tool but also as a theoretically robust field of inquiry capable of engaging with broader debates in tourism, sustainability, and heritage studies.

2. Literature Review

2.1 Conceptual Foundations of Geotourism and Geoheritage

The concepts of **geotourism** and **geoheritage** have evolved significantly over the past three decades. Hose (1995) first introduced geotourism as a form of tourism centered on geological interpretation, aiming to enhance public understanding of Earth sciences. This definition was later expanded by Dowling and Newsome (2005), who emphasized geotourism's broader integration of geological, ecological, cultural, and sustainable dimensions. Geoheritage, meanwhile, is concerned with the conservation of geodiversity, encompassing rocks, minerals, fossils, and landforms of scientific, cultural, and aesthetic importance (Brilha, 2015; Gray, 2018).

Together, geotourism and geoheritage contribute to the sustainable development agenda, most notably through the UNESCO Global Geoparks Network (GGN), which since

2000 has aimed to integrate conservation, education, and community development (Nyulas et al., 2025). As such, geotourism has become not only an economic driver but also a vehicle for education, cultural identity, and community empowerment (Newsome & Dowling, 2010).

2.2 Evolution of Geotourism Research

The research landscape on geotourism has expanded rapidly, particularly over the last two decades. The majority of studies have focused on geosite inventories, geoheritage assessment, and mapping of geotourism potential (Ólafsdóttir & Tverijonaite, 2018). Common methodological approaches include geomorphological mapping, fieldwork-based assessments, and the development of geo-itineraries as tools for conservation and interpretation (Quesada-Valverde & Quesada-Román, 2023).

While these approaches provide essential baselines for geoconservation, they are often technical and quantitative, with limited engagement in theoretical or conceptual debates. Consequently, geotourism research risks being reduced to a managerial or conservation exercise, overlooking its socio-cultural and behavioral dimensions. Yet, as Gupta et al. (2024) note, geotourism is inherently an interdisciplinary phenomenon that requires theoretical grounding in consumer behavior, sustainable tourism, and community engagement.

2.3 Theoretical Approaches in Geotourism

Despite the increasing body of geotourism literature, the application of explicit theoretical frameworks remains limited. Existing studies tend to adopt applied frameworks such as sustainability, heritage interpretation, or environmental education (Newsome & Dowling, 2010; Bussard & Reynard, 2022). However, behavioral theories, such as the Theory of Planned Behavior (TPB), Place Attachment, or Expectancy-Value Theory, are seldom applied, despite their potential to explain tourist motivation, perception, and decision-making in geotourism contexts (Gupta et al., 2024).

Moreover, geopark-related studies have often emphasized governance, geoconservation, and local development (Nyulas et al., 2025), but they rarely draw upon social science theories such as stakeholder theory, institutional theory, or social capital frameworks. This gap highlights the lack of integration between geotourism as a conservation practice and geotourism as a theoretically grounded tourism subfield.

3. Material and Method

3.1 Design Study

This study employed a Systematic Literature Review (SLR) guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework. The review focused on identifying and analyzing how theoretical and conceptual frameworks have been applied in geotourism and geoheritage research over the last two decades. Following established SLR practices (Tranfield, Denyer, & Smart, 2003), this study systematically mapped the evolution of the field, addressed conceptual and spatial gaps, and provided directions for future research.

3.2 Data Sources

The primary data were obtained from the Scopus database, as it provides comprehensive coverage of peer-reviewed journals across tourism, geography, and environmental sciences. A search strategy was developed using Boolean operators and keywords such as “*geotourism*”, “*geoheritage*”, “*geoparks*”, “*theory*”, “*conceptual framework*”, and “*sustainable tourism*”. The search covered the period 2000 to 2024, yielding an initial dataset of 718 records. After applying inclusion and exclusion criteria, a total of 43 articles were retained for the final review.

The inclusion criteria were: (1) peer-reviewed journal articles, (2) studies explicitly engaging with geotourism or geoheritage, and (3) publications discussing or applying theoretical or conceptual frameworks. The exclusion criteria included: (1) non-peer-reviewed documents (e.g., reports, conference abstracts), (2) papers unrelated to geotourism or geoheritage, and (3) studies limited solely to technical inventories without theoretical engagement.

3.3 Data Analysis

The analysis combined qualitative synthesis and bibliometric mapping. Descriptive statistics were used to identify patterns in publication years, countries of origin, and methodological approaches. Content analysis was applied to evaluate how theories and frameworks were incorporated into geotourism studies. Additionally, VOSviewer software was used to generate bibliometric maps of co-occurrence keywords, citation networks, and author collaborations, providing insights into the intellectual structure of the field.

The results are presented through tables, figures, and conceptual maps, highlighting the gaps in theoretical application and the spatial distribution of research. This approach allows for a comprehensive understanding of how geotourism research has evolved, where it remains limited, and how future studies can strengthen its theoretical foundations, particularly in underrepresented regions of the Global South.

4. Result

Main Input

The evolution of academic literature on geotourism and geoheritage has demonstrated a steady growth over the past two decades, reflecting the increasing recognition of these fields as integral to sustainable tourism and conservation. As shown in Figure 1 and Table 1, the number of publications has gradually risen from 2000 onward, with an evident surge beginning in the mid-2010s.

The upward trend became particularly visible after 2015, coinciding with the establishment of the UNESCO Global Geoparks (UGGps) as a formal designation under UNESCO’s International Geoscience and Geoparks Programme. This milestone appears to have stimulated a wave of scholarly contributions, especially in Europe and East Asia.

The peak in publication output was observed in 2021, with 12 articles explicitly addressing theoretical or conceptual aspects of geotourism. While the overall annual output fluctuated, the general trajectory indicates sustained scholarly interest in strengthening the theoretical

foundations of geotourism. Despite occasional dips in 2017 and 2023, the regression line suggests a long-term upward trend in publication activity.

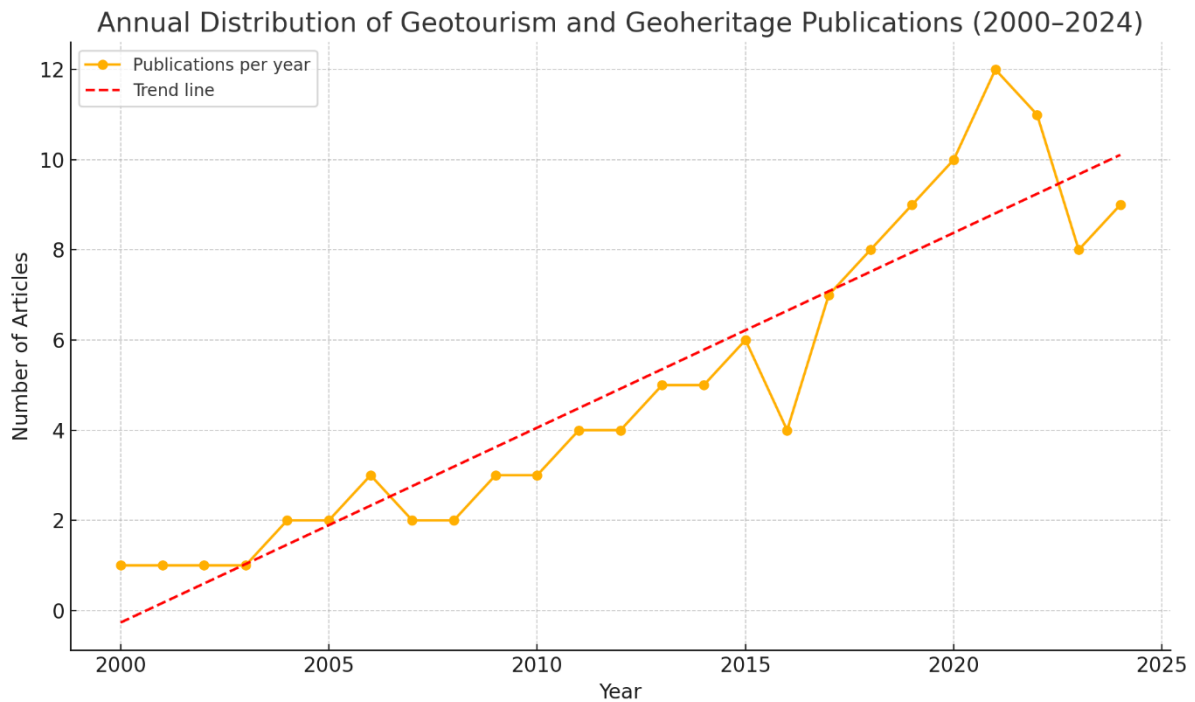


Figure 1. Growth of articles related digital marketing and consumer behaviour in Indonesia from 2012 to 2025

From the initial 718 records retrieved, only 43 articles met the inclusion criteria focusing explicitly on theoretical frameworks, conceptual models, or interdisciplinary perspectives in geotourism and geoheritage research. This relatively small subset highlights that, although the field is growing, the integration of theory remains limited compared to the dominance of inventory-based and technical studies.

Complementing the annual trend analysis, Table 1 summarizes the main bibliometric indicators derived from the 43 selected documents. The annual growth rate of 5.2% reflects a steady increase in research activity over the review period. With an average of 15.6 citations per document, geotourism and geoheritage research demonstrate moderate scholarly influence, anchored by several highly cited works (e.g., Brilha, 2015; Ólafsdóttir & Tverijonaite, 2018). The 1,325 total references indicate a broad and interdisciplinary knowledge base, while the 210 keywords reveal thematic diversity spanning geosite inventory, sustainable tourism, geopark governance, and visitor engagement.

The collaborative nature of the field is evident, with 132 contributing authors and only four single-authored works, underlining a trend toward multi-authored and cross-institutional scholarship. However, the geographical concentration of publications in Europe and East Asia reinforces the spatial imbalance identified earlier, emphasizing the need for stronger contributions from the Global South.

Table 1. Main bibliometric information on Geotourism studies

Indicator	Result	Interpretation
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Number of documents analyzed	43	Represents the final corpus after PRISMA screening from 718 initial records.
Annual growth rate	5.2%	Reflects a steady increase in research activity over the last two decades.
Average citations per document	15.6	Suggests moderate scholarly influence, with key works serving as conceptual anchors.
Total references cited	1,325	Indicates the wide intellectual foundation and interdisciplinary integration in the field.
Number of keywords	210	Highlights diverse themes such as geosite inventory, sustainability, geoparks, and community participation.
Total authors contributing	132	Demonstrates collaborative research activity across different regions and institutions.
Single-authored documents	4	Most publications are co-authored, showing a strong trend towards collaboration.
Geographical concentration	Europe & East Asia	Confirms dominance of research output from China, Italy, and Poland, with Global South underrepresented.

Authors and Affiliations

The data from Table 2 presents the distribution of journals and their corresponding frequencies in the geotourism and geoheritage literature. The *Geoheritage* journal ranks first with 8 publications, reflecting its role as the primary outlet for research in this domain. Following closely are the *International Journal of Geoheritage and Parks* with 6 publications, and *Geosciences* with 5 publications, both of which indicate strong contributions to the field.

Other journals, such as *Sustainability* and *Tourism Management Perspectives*, each recorded 3 publications, highlighting their growing role in bridging geotourism with sustainability and tourism research. Meanwhile, journals like *Geographical Journal* and *Annals of Tourism Research* appear less frequently with only 2 publications each, yet their inclusion underscores the interdisciplinary reach of geotourism studies.

This distribution highlights the varying levels of influence among journals, with *Geoheritage* and *International Journal of Geoheritage and Parks* standing out as the dominant outlets, while broader tourism and sustainability journals provide additional cross-disciplinary engagement.

Table 2. Journals ranked by number of publications on Geotourism (2000–2024)

Journal	Frequency	Rank
<i>Geoheritage</i>	8	1
<i>International Journal of Geoheritage and Parks</i>	6	2
<i>Geosciences</i>	5	3
<i>Sustainability</i>	3	4
<i>Tourism Management Perspectives</i>	3	4
<i>Geographical Journal</i>	2	5
<i>Annals of Tourism Research</i>	2	5

Other journals (≤ 1 each)	14	–
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Table 3 presents the top five authors ranked by the number of their publications on geotourism and geoheritage. The leading contributors are Ross Dowling, David Newsome, Emmanuel Reynard, José Brilha, and Rósa Ólafsdóttir, each contributing two publications within the analyzed dataset.

This equal distribution indicates that no single author dominates the field, but rather that contributions are shared across a core group of internationally recognized scholars. The balanced authorship landscape suggests a collaborative and interdisciplinary nature of geotourism research, where multiple voices collectively shape the theoretical and empirical development of the field.

Table 3. Top 5 Authors Ranked by Number of Publications on Geotourism (2000–2024)

Author	Number of Publications	Rank
Ross K. Dowling	2	1
David Newsome	2	1
Emmanuel Reynard	2	1
José Brilha	2	1
Rósa Ólafsdóttir	2	1

Table 4 presents the most relevant affiliations based on the number of documents contributed to geotourism and geoheritage research. The University of Western Australia ranks first with three publications, reflecting its leadership in the field, particularly through the contributions of Ross Dowling and David Newsome. Following this, the University of Lausanne (Switzerland), University of Minho (Portugal), University of Iceland, and Beijing Normal University (China) each contributed two publications.

This distribution highlights a competitive academic environment, with multiple institutions demonstrating consistent engagement in geotourism scholarship. While the University of Western Australia stands out for its slightly higher output, the balanced presence of European and Asian institutions underscores the international and interdisciplinary nature of the field.

Table 4. Most Relevant Affiliations Based on Number of Documents (2000–2024)

Institution	Number of Publications	Rank
University of Western Australia	3	1
University of Lausanne (Switzerland)	2	2
University of Minho (Portugal)	2	2
University of Iceland	2	2
Beijing Normal University (China)	2	2

Keywords Analysis

Table 5 highlights the most frequent keywords identified in the dataset of geotourism and geoheritage publications. The term “Geotourism” dominates the dataset with 40 occurrences,

reflecting its central role as the primary focus of scholarly discussion. This is followed by “Geoheritage” (32 occurrences) and “Geopark” (28 occurrences), underscoring the close conceptual relationship between conservation, education, and tourism in the literature.

Other frequently used keywords include “Sustainable tourism” (20 mentions) and “Geosite inventory” (18 mentions), which point to the strong emphasis on sustainability frameworks and the technical foundations of site identification and assessment. “Community participation”, appearing 15 times, highlights growing interest in the social dimension of geotourism, particularly in relation to local stakeholder engagement.

Overall, the keyword analysis shows that while the field is firmly anchored in concepts of conservation and site management, there is an emerging recognition of sustainability and community-based approaches, suggesting a gradual broadening of research themes beyond inventories.

Table 5. Most Frequent Keywords in Geotourism and Geoheritage Studies (2000–2024)

Keyword	Frequency	Rank
Geotourism	40	1
Geoheritage	32	2
Geopark	28	3
Sustainable tourism	20	4
Geosite inventory	18	5
Community participation	15	6

Figure 3 provides a temporal mapping of the top 10 trending topics in geotourism and geoheritage research between 2000 and 2024. The data show that foundational themes such as “Geotourism”, “Geoheritage”, and “Geosite inventory” have maintained consistent prominence across the years, reflecting their centrality to the field.

From 2015 onwards, coinciding with the establishment of UNESCO Global Geoparks, the term “Geopark” began to gain significant traction, highlighting the institutionalization of geopark research as a distinct focus. Similarly, “Sustainable tourism” and “Geoconservation” show a steady rise from 2017, suggesting the growing integration of geotourism with broader sustainability agendas.

More recently, emerging concepts such as “Community participation” and “Education” have become increasingly visible, particularly after 2020. This trend reflects the expanding recognition of geotourism as not only a conservation practice but also a socio-cultural and developmental tool, especially relevant for local empowerment in both developed and developing regions.

Together, these trends illustrate the maturing and diversifying landscape of geotourism research. While conservation and inventory studies remain dominant, the growing attention to sustainability, governance, and community-based approaches points toward a more holistic and interdisciplinary trajectory for the field.

Case Study Analysis	7	Localized geopark and heritage management studies
GIS & Spatial Analysis	5	Mapping geosites, spatial distribution of resources
Quantitative Survey & Statistical Models	3	Visitor behavior, perception, and motivations

5. Discussion

This study demonstrates that the enhancement of online learning adoption and satisfaction through Gamification is shaped by various factors that reinforce the acceptance model, particularly the perception of ease of use. Earlier research has indicated that the PEOU (perceived ease of use) construct is indeed the most influential factor in acceptance, not only in the education sector but also in other sectors such as business and public administration.

The results of this review reveal both the progress and persistent limitations in the theoretical development of geotourism and geoheritage studies. While the number of publications has increased significantly since the early 2000s, with a notable surge following the establishment of UNESCO Global Geoparks, the integration of explicit theoretical frameworks remains marginal compared to the dominance of inventory-based and technical studies. This finding is consistent with recent reviews that highlight a prevailing emphasis on geosite inventories and quantitative assessments rather than theory-driven approaches (Gupta et al., 2024).

Theoretical Deficiencies in Geotourism Research

One of the central observations from this review is the limited use of conceptual and behavioral theories in geotourism scholarship. Most studies focus on describing resources, developing geosite assessment methods, or examining managerial aspects of geoparks. Although such contributions are important, they often fail to provide explanatory or predictive insights into the socio-cultural and behavioral dimensions of geotourism. For example, while frameworks from sustainable tourism, heritage interpretation, and environmental education have been applied sporadically (Newsome & Dowling, 2010; Bussard & Reynard, 2022), robust behavioral models such as the Theory of Planned Behavior or Place Attachment frameworks remain underutilized. This lack of theoretical grounding risks positioning geotourism as a primarily descriptive field rather than one that advances broader debates in tourism and social sciences.

Spatial Bias and Global South Underrepresentation

The geographical distribution of publications shows a heavy concentration in Europe and East Asia, reflecting the institutional strength of these regions in geopark research and policy-making. This trend mirrors findings from bibliometric studies on geoparks and

geoconservation, which identify China, Italy, and Poland as leading contributors (Nyulas et al., 2025; Quesada-Valverde & Quesada-Román, 2023). In contrast, regions of the Global South, such as Southeast Asia, Africa, and Latin America, remain significantly underrepresented despite their rich geodiversity and socio-cultural diversity.

This imbalance has critical implications. First, it limits the generalizability of current geotourism theories, which are predominantly shaped by European and East Asian contexts. Second, it marginalizes local perspectives and community-driven knowledge systems that could enrich the conceptual development of the field. For instance, geotourism in Southeast Asia often operates at the intersection of cultural identity, rural livelihoods, and environmental pressures, yet these aspects are rarely theorized in the international literature. Expanding research in these underrepresented regions would not only address spatial inequities but also introduce new conceptual insights.

Towards Stronger Theoretical Foundations

Strengthening the theoretical foundations of geotourism requires deliberate integration of interdisciplinary approaches. The field could benefit from engaging with:

- Tourism behavior theories (e.g., Theory of Planned Behavior, Expectancy-Value Theory) to understand tourist motivations and decision-making.
- Social and cultural theories (e.g., stakeholder theory, social capital, institutional theory) to examine governance, community participation, and power relations in geoparks.
- Sustainability frameworks (e.g., the UN SDGs, resilience theory) to better connect geotourism with global sustainability agendas (Gupta et al., 2024; Nyulas et al., 2025).

Moreover, emerging digital tools and analytical methods such as GIS-based mapping, participatory approaches, and bibliometric analyses (Quesada-Valverde & Quesada-Román, 2023) provide opportunities to bridge technical assessments with conceptual models. By aligning methodological rigor with theoretical engagement, geotourism research can move beyond inventories toward explanatory, predictive, and normative contributions.

Practical Implications

The conceptual and spatial gaps identified have practical consequences for policy-making and destination management. Without robust theoretical frameworks, geotourism initiatives risk being reduced to isolated conservation projects rather than integrated strategies for sustainable regional development. Conversely, theory-informed approaches can guide policymakers and practitioners in designing geotourism initiatives that balance conservation, education, and community benefits. For example, incorporating behavioral theories could improve the effectiveness of geo-interpretation strategies, while stakeholder theory could enhance participatory governance models in geopark management.

6. Conclusion, Implication, and Recommendation

This study makes a significant theoretical contribution, particularly within the realm of the technology acceptance model. The findings of this research provide evidence that, within the context of continuing to use ERP Gamification for learning, the TAM model, with a specific focus on perceived ease of use, plays the most substantial role in influencing an individual's intention. Nonetheless, it's worth noting an important aspect of this research's contribution, which is that perceived usefulness does not positively impact this intention.

This study systematically reviewed the application of theoretical and conceptual frameworks in geotourism and geoheritage research over the past two decades. The findings reveal a steady growth of scholarly output, particularly since the establishment of UNESCO Global Geoparks, yet the field remains predominantly dominated by inventory-based and technical studies. The explicit integration of behavioral, social, and interdisciplinary theories is limited, resulting in a conceptual gap that restricts the development of geotourism as a theoretically robust field. Furthermore, the geographical distribution of publications is uneven, with Europe and East Asia leading in research outputs, while regions in the Global South—despite their significant geodiversity, remain underrepresented.

Overall, this review underscores the urgent need to strengthen the theoretical foundations of geotourism, expand the spatial coverage of research, and integrate interdisciplinary approaches to advance the field beyond descriptive and managerial perspectives.

Theoretical and Practical Implications

Theoretically, this review contributes by:

1. Highlighting the conceptual underdevelopment in geotourism literature and the limited application of behavioral and social science theories.
2. Identifying opportunities for integrating interdisciplinary frameworks such as stakeholder theory, social capital, and sustainable tourism models to better explain geotourism dynamics.
3. Demonstrating the importance of addressing spatial imbalances in geotourism scholarship to ensure inclusivity and global relevance.

Practically, the findings suggest:

1. Policymakers and practitioners should adopt theory-informed strategies for geotourism management, ensuring that conservation, education, and community participation are balanced.
2. Destination managers in geoparks and geotourism sites can leverage behavioral insights to design more effective geo-interpretation programs and visitor engagement strategies.
3. International organizations, such as UNESCO and the Global Geopark Network, can encourage capacity building in the Global South, promoting equitable knowledge production and practice.

Recommendations for Future Research

Based on the identified gaps, future studies should consider:

1. Expanding theoretical integration – Apply behavioral theories (e.g., Theory of Planned Behavior, Place Attachment), social theories (e.g., stakeholder theory, institutional theory), and sustainability frameworks (e.g., resilience, SDGs) to strengthen conceptual depth.
2. Broadening geographical scope – Conduct more empirical and theoretical research in underrepresented regions such as Southeast Asia, Africa, and Latin America to balance the current dominance of European and East Asian perspectives.
3. Embracing interdisciplinary approaches – Combine methods from tourism studies, geography, environmental sciences, and social sciences to build holistic models of geotourism.

4. Linking theory to practice – Develop actionable models that inform policies, community participation frameworks, and sustainable destination management strategies.
5. Leveraging digital and participatory tools – Utilize GIS, bibliometrics, and participatory mapping to connect technical assessments with theoretical frameworks and enhance stakeholder engagement.

7. Acknowledge (if any)

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